Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

# General

## Guideline Title

Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: an updated report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine.

## Bibliographic Source(s)

Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: an updated report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. Anesthesiology. 2017 Apr;126(4):585-601. [174 references] PubMed

## Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Society of Anesthesiologists Task Force on Infectious Complications [trunc]. Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: a report by the American Society of Anesthesiologists Task Force on Infectious Complications [trunc]. Anesthesiology. 2010 Mar;112(3):530-45. [175 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

# NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

= Poor = Fair = Good = Very Good = Excellent

| Assessment | Standard of Trustworthiness |
|---|---|
| YES | Disclosure of Guideline Funding Source |

| | |
|---|---|
| ▮▮▮▯▯ | Disclosure and Management of Financial Conflict of Interests |
| | Guideline Development Group Composition |
| YES | Multidisciplinary Group |
| YES | Methodologist Involvement |
| ▮▯▯▯▯ | Patient and Public Perspectives |
| | Use of a Systematic Review of Evidence |
| ▮▮▮▯▯ | Search Strategy |
| ▮▮▮▮▯ | Study Selection |
| ▮▮▮▮▮ | Synthesis of Evidence |
| | Evidence Foundations for and Rating Strength of Recommendations |
| ▮▮▮▮▮ | Grading the Quality or Strength of Evidence |
| ▮▮▮▮▮ | Benefits and Harms of Recommendations |
| ▮▮▮▮▯ | Evidence Summary Supporting Recommendations |
| ▮▯▯▯▯ | Rating the Strength of Recommendations |
| ▮▮▮▮▯ | Specific and Unambiguous Articulation of Recommendations |
| ▮▮▯▯▯ | External Review |
| ▮▮▮▯▯ | Updating |

# Recommendations

## Major Recommendations

Prevention of Infectious Complications Associated with Neuraxial Techniques

Before performing neuraxial techniques, conduct a history and physical examination relevant to the procedure and review relevant laboratory studies* in order to identify patients who may be at risk of infectious complications.
Consider alternatives to neuraxial techniques for patients at high risk.
When neuraxial techniques are selected in a known or suspected bacteremic patient, consider administering preprocedure antibiotic therapy.
Select neuraxial technique on a case-by-case basis, including a consideration of the evolving medical status of the patient.
Avoid lumbar puncture in the patient with a known epidural abscess.
Use aseptic techniques during preparation of equipment (e.g., ultrasound) and the placement of

neuraxial needles and catheters,[†] including:

- Removal of jewelry (e.g., rings and watches)
- Hand washing
- Wearing of caps
- Wearing of masks covering both mouth and nose – Consider changing masks before each new case
- Use of sterile gloves
- Sterile draping of the patient

Use individual packets of antiseptics for skin preparation.

Use an antiseptic solution (e.g., chlorhexidine with alcohol) for skin preparation, allowing for adequate drying time.[‡]

Use sterile occlusive dressings at the catheter insertion site.

Bacterial filters may be considered during extended continuous epidural infusion.

Limit the disconnection and reconnection of neuraxial delivery systems in order to minimize the risk of infectious complications.

Consider removing unwitnessed accidentally disconnected catheters.

Catheters should not remain *in situ* longer than clinically necessary.

*Ordering, conducting, or requiring routine laboratory studies may not be necessary.

†The Centers for Disease Control and Prevention (CDC) and the American Society of Regional Anesthesia and Pain Medicine (ASRA) have also published recommendations regarding asepsis and management of patients undergoing neuraxial techniques. These are available from the CDC and SRA Web sites.

‡Consult product labels for instructions regarding the proper use, application, and drying time for skin antiseptics.

Diagnosis of Infectious Complications Associated with Neuraxial Techniques

Perform daily evaluation of patients with indwelling catheters for early signs and symptoms (e.g., fever, backache, headache, erythema, and tenderness at the insertion site) of infectious complications throughout their stay in the facility.[§]

To minimize the impact of an infectious complication, promptly attend to signs or symptoms.

If an infection is suspected:

- Remove an in situ catheter and consider culturing the catheter tip.
- Order appropriate blood tests.
- Obtain appropriate cultures.
- If an abscess is suspected or neurologic dysfunction is present, perform imaging studies and promptly obtain consultation with other appropriate specialties.

§Immunocompromised patients may not manifest typical signs and symptoms of infection.

Management of Infectious Complications

Administer appropriate antibiotic therapy at the earliest sign or symptom of a serious neuraxial infection.

Consider consultation with a physician with expertise in the diagnosis and treatment of infectious diseases.

If an abscess is present, obtain surgical consultation to determine whether percutaneous drainage of the abscess or surgery (e.g., laminectomy) is warranted.

## Clinical Algorithm(s)

None provided

# Scope

## Disease/Condition(s)

## Disease/Condition(s)

Infectious complications associated with neuraxial techniques

Note: For this Advisory, *infectious complications* are defined as serious infections associated with the use of neuraxial techniques. Infectious complications include, but are not limited to, epidural, spinal, or subdural abscess; paravertebral, paraspinous, or psoas abscess; meningitis; encephalitis; sepsis; bacteremia; viremia; fungemia; osteomyelitis; or discitis. Although colonization of the catheter is not considered an infection, it may be considered a *precursor* to infection, and is reported as an outcome in this Advisory.

## Guideline Category

Diagnosis

Evaluation

Management

Prevention

Treatment

## Clinical Specialty

Anesthesiology

Critical Care

Nursing

Surgery

## Intended Users

Advanced Practice Nurses

Allied Health Personnel

Hospitals

Nurses

Physician Assistants

Physicians

## Guideline Objective(s)

To reduce the risk of infectious complications associated with neuraxial techniques by identifying or describing:

- Patients who are at increased risk of infectious complications
- Techniques for reducing infectious risk
- Interventions to improve outcomes after infectious complications

## Target Population

Patients receiving neuraxial techniques in inpatient (e.g., operating rooms, intensive care units, postoperative surgical floors, labor and delivery settings, or hospital wards) and ambulatory facilities such

as pain clinics

Note: This updated Advisory does not address patients with implantable drug or chronic indwelling neuraxial analgesic delivery systems or injection techniques outside of the neuraxis (e.g., peripheral nerve blocks or joint and bursal injections).

## Interventions and Practices Considered

Evaluation

- History and physical examination
- Review of relevant laboratory studies
- Daily evaluation of patients with indwelling catheters for early signs or symptoms

Management

- Selection of neuraxial technique
- Preprocedure antibiotic therapy (in known or suspected bacteremic patients)
- Avoidance of lumbar puncture in patients with known epidural abscess
- Aseptic techniques during equipment preparation and placement of neuraxial needles and catheters
- Use of individual packets of antiseptics and antiseptic solution for skin preparation
- Use of sterile occlusive dressings at the catheter insertion site
- Bacterial filter use during extended continuous epidural infusion
- Limiting of disconnection and reconnection of neuraxial delivery systems
- Management of unwitnessed accidently disconnected catheter
- Removal of catheters when no longer clinically necessary
- Prompt intervention on signs and symptoms of infection (catheter removal, blood tests, cultures, imaging, consultation)
- Antibiotic therapy
- Consideration of infectious disease consultation
- Surgical consultation if abscess is present

## Major Outcomes Considered

Incidence of infectious complications associated with neuraxial techniques

# Methodology

## Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

## Description of Methods Used to Collect/Select the Evidence

Availability of Evidence

Preparation of this update used the same methodological process as was used in the original Advisory to obtain new scientific evidence. Opinion-based evidence obtained from the original Advisory is reported in this update. The protocol for reporting each source of evidence is described in the "Rating Scheme for Strength of Evidence" field.

Scientific evidence used in the development of this updated Advisory is based on cumulative findings from literature published in peer-reviewed journals. Literature citations are obtained from health care databases, direct Internet searches, Task Force members, liaisons with other organizations, and manual searches of references located in reviewed articles.

State of the Literature

For the systematic literature review, potentially relevant clinical studies were identified via electronic and manual searches of the literature. Health care database searches included PubMed, Web of Science, Google Books, and the Cochrane Central Register of Controlled Trials. The updated searches covered a 6.25-year period from January 1, 2010, through March 31, 2016. New citations were reviewed and combined with pre-2010 articles used in the previous update, resulting in a total of 524 articles reviewed. Search terms consisted of the interventions indicated in Appendix 2 of the original guideline document guided by the appropriate inclusion/exclusion criteria as stated in the "Focus" of the Advisory. Only studies containing original findings from peer-reviewed journals are acceptable. Editorials, letters, and other articles without data are excluded. A complete bibliography used to develop this updated Advisory, organized by section, is available as Supplemental Digital Content 2 (see the "Availability of Companion Documents" field).

## Number of Source Documents

220 articles were found to contain direct linkage-related evidence.

## Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

Scientific Evidence

Findings from the aggregated literature are reported in the text of the updated Advisory by evidence category, level, and direction. Evidence categories refer specifically to the strength and quality of the *research design* of the studies. Category A evidence represents results obtained from randomized controlled trials (RCTs) and Category B evidence represents observational results obtained from nonrandomized study designs or RCTs without pertinent comparison groups. When available, Category A evidence is given precedence over Category B evidence for any particular outcome. These evidence categories are further divided into evidence levels. Evidence levels refer specifically to the strength and quality of the summarized study *findings* (i.e., statistical findings, type of data, and the number of studies). In the document, only the highest level of evidence is included in the summary report for each intervention-outcome pair, including a directional designation of benefit, harm, or equivocality for each outcome.

Category A

RCTs report comparative findings between clinical interventions for specified outcomes. Statistically significant ($P < 0.01$) outcomes are designated as either beneficial (B) or harmful (H) for the patient; statistically nonsignificant findings are designated as equivocal (E).

*Level 1*: The literature contains a sufficient number of RCTs to conduct meta-analysis,[§] and meta-analytic findings from these aggregated studies are reported as evidence.

*Level 2*: The literature contains multiple RCTs, but the number of RCTs is not sufficient to conduct a

viable meta-analysis. Findings from these RCTs are reported separately as evidence.

*Level 3*: The literature contains a single RCT and findings are reported as evidence.

Category B

Observational studies or RCTs without pertinent comparison groups may permit *inference* of beneficial or harmful relationships among clinical interventions and clinical outcomes. Inferred findings are given a directional designation of beneficial (B), harmful (H), or equivocal (E). For studies that report statistical findings, the threshold for significance is $P < 0.01$.

*Level 1*: The literature contains observational comparisons (e.g., cohort, case-control research designs) with comparative statistics between clinical interventions for a specified clinical outcome.

*Level 2*: The literature contains noncomparative observational studies with associative statistics (e.g., relative risk, correlation, sensitivity/specificity).

*Level 3*: The literature contains noncomparative observational studies with descriptive statistics (e.g., frequencies, percentages).

*Level 4*: The literature contains case reports.

Insufficient Literature

The *lack* of sufficient scientific evidence in the literature may occur when the evidence is either unavailable (i.e., no pertinent studies found) or inadequate. Inadequate literature cannot be used to assess relationships among clinical interventions and outcomes because a clear interpretation of findings is not obtained due to methodological concerns (e.g., confounding of study design or implementation) or the study does not meet the inclusion criteria for content as defined in the "Focus" of the Advisory.

Opinion-based Evidence

All opinion-based evidence (e.g., survey data, open-forum testimony, Internet-based comments, letters, and editorials) relevant to each topic was considered in the development of this updated Advisory. However, only the findings obtained from formal surveys are reported in the current update.

Opinion surveys were developed to address each clinical intervention identified in the document. Identical surveys were distributed to expert consultants and a random sample of American Society of Anesthesiologists (ASA) members.

Category A: Expert Opinion

Survey responses from Task Force–appointed expert consultants are reported in summary form in the text, with a complete listing of consultant survey responses reported in a table in appendix 2 in the original guideline document.

Category B: Membership Opinion

Survey responses from a random sample of active members of the ASA are reported in summary form in the text, with a complete listing of responses reported in appendix 2 in the original guideline document.

Survey responses from expert and membership sources are recorded using a 5-point scale and summarized based on median values.**

*Strongly Agree*: Median score of 5 (at least 50% of the responses are 5)

*Agree*: Median score of 4 (at least 50% of the responses are 4 or 4 and 5)

*Equivocal*: Median score of 3 (at least 50% of the responses are 3, or no other response category or combination of similar categories contain at least 50% of the responses)

*Disagree*: Median score of 2 (at least 50% of responses are 2 or 1 and 2)

*Strongly Disagree*: Median score of 1 (at least 50% of responses are 1)

Category C: Informal Opinion

Open-forum testimony obtained during development of the original Advisory, Internet-based comments, letters, and editorials are all informally evaluated and discussed during the formulation of Advisory statements. When warranted, the Task Force may add educational information or cautionary notes based on this information.

§All meta-analyses are conducted by the ASA methodology group. Meta-analyses from other sources are reviewed but not included as evidence in this document.

**When an equal number of categorically distinct responses are obtained, the median value is determined by calculating the arithmetic mean of the two middle values. Ties are calculated by a predetermined formula.

## Methods Used to Analyze the Evidence

Meta-Analysis

Systematic Review with Evidence Tables

## Description of the Methods Used to Analyze the Evidence

Each pertinent outcome reported in a study was classified by evidence category and level and designated as beneficial, harmful, or equivocal. Findings were then summarized for each evidence linkage and reported in the text of the updated Advisory.

For the original Advisory, interobserver agreement among Task Force members and two methodologists was established by interrater reliability testing. Agreement levels using a κ statistic for two-rater agreement pairs were as follows: (1) type of study design, κ = 0.79 to 0.92; (2) type of analysis, κ = 0.84 to 1.00; (3) evidence linkage assignment, κ = 0.81 to 1.00; and (4) literature inclusion for database, κ = 0.75 to 1.00. Three-rater chance-corrected agreement values were: (1) study design, Sav = 0.965, Var (Sav) = 0.001; (2) type of analysis, Sav = 0.961, Var (Sav) = 0.001; (3) linkage assignment, Sav = 0.637, Var (Sav) = 0.025; (4) literature database inclusion, Sav = 0.824, Var (Sav) = 0.019. These values represent moderate to high levels of agreement.

Consensus-based Evidence

For the original Advisory, consensus was obtained from multiple sources, including: (1) survey opinions from consultants who were selected based on their knowledge or expertise in neuraxial techniques, (2) survey opinions solicited from active members of the American Society of Anesthesiology (ASA), (3) testimony from attendees of publicly-held open forums at four national anesthesia meetings, (4) Internet commentary, and (5) Task Force opinion and interpretation. The survey rate of return was 39% (n = 46 of 119) for the consultants, and 239 surveys were received from active ASA members. Results of the surveys are reported in tables 1 and 2, and summarized in the text of the updated Advisory.

The consultants were asked to indicate which, if any, of the evidence linkages would change their clinical practices if the Advisory was instituted. The rate of return was 14% (n = 17 of 119). The percent of responding consultants expecting a change in their practice associated with each linkage topic was as follows: (1) history and physical examination = 5.9%; (2) use and selection of neuraxial techniques = 5.9%, aseptic techniques = 41.2%; (3) disconnection and reconnection of catheters = 23.5%; (4) duration of catheterization = 6.9%; (5) checking for signs and symptoms of an infectious complication = 5.9%; (6) use of antibiotics = 5.9%; and (7) consultation with other specialists = 5.9%. Eighty-eight percent of the respondents indicated that the Advisory would have no effect on the amount of time spent on a typical case, and 11.8% indicated an average increase of 2.8 minutes in the amount of time expected to spend on a typical case with the implementation of this Advisory. Eighty-two percent indicated that new equipment, supplies, or training would not be needed in order to implement the guidelines, and 76.4% indicated that implementation of the Advisory would not require changes in

practice that would affect costs.

## Methods Used to Formulate the Recommendations

Expert Consensus

## Description of Methods Used to Formulate the Recommendations

Task Force Members and Consultants

In 2015, the American Society of Anesthesiologists (ASA) Committee on Standards and Practice Parameters requested that scientific evidence for this Advisory be updated. The update consists of an evaluation of literature that includes new studies obtained after publication of the original Advisory.

The original Advisory was developed by an ASA-appointed Task Force of 10 members, including anesthesiologists in both private and academic practice from various geographic areas of the United States and two consulting methodologists from the ASA Committee on Standards and Practice Parameters.

The Task Force developed the original Advisory by means of a seven-step process. First, they reached consensus on the criteria for evidence. Second, a systematic review and evaluation was performed on original published research studies from peer-reviewed journals relevant to infectious complications associated with neuraxial techniques. Third, a panel of expert consultants was asked to participate in opinion surveys on the effectiveness of various strategies for prevention, diagnosis, and management of infectious complications associated with neuraxial techniques, and to review and comment on a draft of the Advisory. Fourth, opinions about the Advisory were solicited from a random sample of active members of the ASA. Fifth, the Task Force held open forums at four major national meetings‡ to solicit input on its draft advisory statements. Sixth, the consultants were surveyed to assess their opinions on the feasibility of implementing the Advisory. Seventh, all available information was used to build consensus within the Task Force to formulate the final document. A summary of recommendations is found in Appendix 1 in the original guideline document.

‡American Society of Regional Anesthesia, Huntington Beach, California, November 22, 2008; Postgraduate Assembly in Anesthesiology, New York, New York, December 13, 2008; American Society of Regional Anesthesia, Phoenix, Arizona, May 1, 2009; Society of Obstetrical Anesthesia and Perinatology, Washington, DC, May 1, 2009.

## Rating Scheme for the Strength of the Recommendations

Not applicable

## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

Internal Peer Review

## Description of Method of Guideline Validation

These guidelines were submitted for publication October 26, 2016; accepted for publication October 26, 2016; approved by the ASA House of Delegates on October 26, 2016.

# Evidence Supporting the Recommendations

## Type of Evidence Supporting the Recommendations

Evidence was obtained from two principal sources: scientific evidence and opinion-based evidence.

# Benefits/Harms of Implementing the Guideline Recommendations

## Potential Benefits

Prevention and management of infectious complications, including

- Epidural, spinal or subdural abscess
- Paravertebral, paraspinous, or psoas abscess
- Meningitis
- Encephalitis
- Sepsis
- Bacteremia
- Viremia
- Fungemia
- Osteomyelitis
- Discitis
- Catheter colonization (precursor to infection)

Refer to the "Literature Findings" sections in the original guideline document for potential benefits of specific interventions.

## Potential Harms

The Task Force recognizes that even with prompt medical intervention, recovery may be poor or incomplete in patients with an infectious complication.

Refer to the "Literature Findings" sections in the original guideline document for potential harms of specific interventions.

# Contraindications

## Contraindications

Lumbar punctures should be avoided in patients with a known epidural abscess.

# Qualifying Statements

## Qualifying Statements

- Practice advisories are systematically developed reports that are intended to assist decision-making in areas of patient care. Advisories provide a synthesis of scientific literature and analysis of expert

opinion, clinical feasibility data, open forum commentary, and consensus surveys. Practice advisories developed by the American Society of Anesthesiologists (ASA) are not intended as standards, guidelines, or absolute requirements, and their use cannot guarantee any specific outcome. They may be adopted, modified, or rejected according to clinical needs and constraints, and they are not intended to replace local institutional policies.

- Practice advisories summarize the state of the literature and report opinions obtained from expert consultants and ASA members. They are not supported by scientific literature to the same degree as standards or guidelines because of the lack of sufficient numbers of adequately controlled studies. Practice advisories are subject to periodic revision as warranted by the evolution of medical knowledge, technology, and practice.

# Implementation of the Guideline

## Description of Implementation Strategy

An implementation strategy was not provided.

# Institute of Medicine (IOM) National Healthcare Quality Report Categories

## IOM Care Need

Staying Healthy

## IOM Domain

Effectiveness

Safety

# Identifying Information and Availability

## Bibliographic Source(s)

Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: an updated report by the American Society of Anesthesiologists Task Force on Infectious Complications Associated with Neuraxial Techniques and the American Society of Regional Anesthesia and Pain Medicine. Anesthesiology. 2017 Apr;126(4):585-601. [174 references] PubMed

## Adaptation

Not applicable: The guideline was not adapted from another source.

## Date Released

2017 Apr

## Guideline Developer(s)

American Society of Anesthesiologists - Medical Specialty Society

American Society of Regional Anesthesia and Pain Medicine - Medical Specialty Society

## Source(s) of Funding

Support was provided solely from institutional and/or departmental sources.

## Guideline Committee

American Society of Anesthesiologists Committee on Standards and Practice Parameters

## Composition of Group That Authored the Guideline

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## Financial Disclosures/Conflicts of Interest

The authors declare no competing interests.

## Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Society of Anesthesiologists Task Force on Infectious Complications [trunc]. Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: a report by the American Society of Anesthesiologists Task Force on Infectious Complications [trunc]. Anesthesiology. 2010 Mar;112(3):530-45. [175 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

## Guideline Availability

Available from the Anesthesiology Journal Web site .

## Availability of Companion Documents

The following are available:

Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: an updated report. Supplemental digital content 1: bibliography in alphabetical order. Schaumburg (IL): American Society of Anesthesiologists; 2017. 12 p. Available from the Anesthesiology Journal Web site .

Practice advisory for the prevention, diagnosis, and management of infectious complications associated with neuraxial techniques: an updated report. Supplemental digital content 2: bibliography by section. Schaumburg (IL): American Society of Anesthesiologists; 2017. 36 p.

Available from the Anesthesiology Journal Web site .

## Patient Resources

None available

## NGC Status

This NGC summary was completed by ECRI Institute on November 4, 2010. This summary was updated by ECRI Institute on March 6, 2014 following the U.S. Food and Drug Administration advisory on Over-the-Counter Topical Antiseptic Products. This NGC summary was updated by ECRI Institute on January 30, 2018. The guideline developer agreed to not review the content.

This NEATS assessment was completed by ECRI Institute on November 28, 2017. The information was verified by the guideline developer on December 8, 2017.

## Copyright Statement



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